

## REMARKS

This communication is in response to the Official Action mailed April 10, 2003. Claims 1-22 were examined. The Examiner also reviewed Applicant's response (mailed February 27, 2003) to the First Official Action of November 27, 2002. Claims 1-22 are still pending.

In the current action, the Examiner withdrew the 35 U.S.C. 102(e) and 103(a) rejections in response to Applicant's arguments. Applicant appreciates the Examiner's withdrawal of these substantive rejections. However, the Examiner rejected claims 1-22 under 35 U.S.C. 112, P1. The Examiner also rejected claims 1-22 under 35 U.S.C. 112, P2. The action was made final.

Applicant reviewed the Official Action and the pending claims. Applicant amends claims 1-7, 9, and 11-16 to further clarify the invention. For reasons set forth below, Applicant requests reconsideration of this application.

### **Entry of Claim Amendments After the Final Official Action is Proper:**

Entry of the present claim amendments after the Final Official Action is proper. The present claim amendments do not introduce claim limitations for which an additional search is required and do not introduce new matter. Applicant's current claim amendments are consistent with Applicant's substantive position of the present invention vis-à-vis the cited references as stated in Applicant's response (dated February 27, 2003) to the first Official Action (mailed November 27, 2002). Furthermore, the present claim amendments are responsive to the Examiner's rejection under 35 U.S.C. 112 by emphasizing the structural and functional aspects of the present invention and removing terminology that the Examiner deems questionable. Accordingly, the claim amendments place this application in better form for allowance or consideration on appeal. Applicant therefore submits that entry of the claim amendments in this response to the Final Official Action is proper and respectfully requests their entry.

**Rejection Under 35 U.S.C. 112, P1 of Claims 1-22:**

The Examiner stated that claims 1-22 are rejected under 35 U.S.C. 112, first paragraph as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains to make and/or use the invention. Applicant respectfully traverses.

Specifically, the Examiner states that the terms “simulation history,” “input history file,” and “value change dump file” are described inconsistently in the specification and in the claims. Applicant disagrees.

From reading the Examiner's arguments, Applicant realizes that the Examiner's main point of contention arises from the Applicant's use of the term “simulation history” and its variation. To address the Examiner's issues, Applicant deleted the term “simulation history” in the current claim amendments. While Applicant used the term to give the claims their broadest scope, Applicant appreciates and understands that the use of such a term has given rise to some confusion with the Examiner.

To elaborate further, the “product” which the present invention is incorporated is an electronic design automation (EDA) tool or a simulator/emulator debug tool. When debugging and testing a user design, millions and millions (if not billions) of simulation time cycles are run with test bench processes feeding input data to the modeled design to test it for proper operation and functional defects (if any). One can appreciate that some form of historical record facilitates the debug process; after all, it would be a colossal waste of time for the test engineer to re-run today the same simulation cycles with the same test bench input data (to the extent that he can reproduce them) that he ran yesterday. If an error occurred in his design, the test engineer should be able to go back and review the historical record of the simulation and focus in on the problem area.

The patent specification discusses several techniques for keeping a historical record. One way is to save the hardware state information at simulation time t0 (refer to FIG. 84). This allows the test

engineer to run the simulation beginning at simulation time  $t_0$  instead of wasting time by re-running the simulation from a time previous to time  $t_0$  (e.g.,  $t-1$ ) all the way up to simulation time  $t_0$ . This is analogous to a word processor saving his/her work up to page 32 and then later, starting at page 32 instead of restarting from page 1. The word processor's work up to page 32 has been saved.

Another way is to save the primary inputs (e.g., from the test bench processes). Saving the primary inputs (and their specific patterns and timing) allows the test engineer to later reproduce certain bugs (if they appear) as well as clear the design from certain bugs. In other words, his unique circuit design is susceptible to certain input test patterns while the circuit design runs perfectly with other input patterns. A combination of saving the hardware state information at simulation time  $t_0$  and the primary inputs allows the test engineer to debug his design in an efficient manner.

A third way to keep a historical record of the debug session is to save hardware state information in the hardware model (resulting from its response to the various test patterns of the primary input) from a specific range of simulation times, or the simulation target range. Instead of state information from a single snapshot of simulation time, the debugger saves state information from a plurality of simulation times. Preferably, this simulation target range contains the bugs that the test engineer has discovered. In one embodiment, the system dumps hardware state information from the simulation target range into the VCD file.

In a variation of the first technique, the system can also save hardware state information from simulation time  $t_3$  (refer to FIG. 84), or the last simulation time in the simulation session range. This way, the test engineer can start later sessions at simulation time  $t_3$  instead of starting over from an earlier time, such as simulation time  $t_0$ .

Thus, as Applicant explained and which will be evident to those ordinarily skilled in the art when they read the patent specification, the patent specification discusses various techniques for saving a

historical record of the debug session. These techniques assist the test engineer greatly in future debug sessions by eliminating the need for the test engineer to re-run previously run simulation times (and input test patterns) as well as facilitating the fine-tuning of the design as bugs are discovered during the debug session. These techniques, and combinations thereof, are recited in the currently amended claims.

So, when the Examiner stated that “simulation history” is “value change dump,” he is not precisely consistent with the patent specification. The “value change dump” (VCD) file is one of many techniques for saving a historical record of the debug process. Similarly, the Examiner stated that the evaluation results are saved in the “simulation history file.” As Applicant explained, this is another way to keep a historical record. The Examiner also asserts that saving the “primary inputs” into “input history file” is somehow inconsistent with saving the input data as “simulation history.” As Applicant explained above, saving the primary inputs is another way of keeping a historical record of the debug session. The patent specification is merely describing various embodiments of the present invention: the primary inputs can be saved in a separate file from the hardware state; the primary inputs and the hardware states can be saved in the same file; the hardware states from simulation times t0 and t3 can be in two different files, or the same file; the VCD file can be a separate file from that containing the primary inputs and the hardware states, or it can be in the same file with the primary inputs and the hardware states. Refer to the patent specification, page 66, lines 3-15.

However, in light of the Examiner’s reading of “simulation history,” Applicant has decided to amend the claims to eliminate this terminology. The preamble to the currently amended claim 1 reads:

1. (Currently amended) A method of creating a record of a debug session simulation history for a selected simulation session range for a hardware modeled design on demand, comprising steps: ...

Consistent amendments have been made to claims 1-7, 9, and 11-16 to address the Examiner's concerns.

The Examiner also rejected claims 5 and 7 under 35 U.S.C. 112, P2. In claims 5 and 7, the Examiner stated that the step of recording contains insufficient antecedent basis. Applicant has amended these claims to provide the necessary antecedent basis. Claims 5 and 7 each depends on claim 1.

The Examiner also rejected claims 1-22 under 35 U.S.C. 112, P2. For the most part, the Examiner raised issues about "simulation history" and "Value change dump." Applicant's claim amendments, explained above, now address the Examiner's concerns.

The Examiner also stated that the lack of "essential structural cooperative elements" in claim 1 render it subject to a 35 U.S.C. 112, P2 rejection. Applicant does not understand the Examiner's argument. The Examiner pointed to several steps that are not in claim 1. Claim 1 calls for selecting a session range, selecting a target range, and generating a VCD file by dumping hardware state information from his model for the target range. Applicant is entitled to claim his invention as broadly as the prior art allows.

The Examiner also rejected claims 9 and 18 for the same reason. Claims 9 and 18 are apparatus claims. Again, the Applicant is not sure what the Examiner's objections are because the Examiner cited elements that are not recited in these claims. In any event, Applicant believes that the current claim amendments address many (if not all) of the Examiner's concerns.

In light of the amendment of claims 1-7, 9, and 11-16 and the discussion above, Applicant requests that the rejection of claims 1-22 under 35 U.S.C. 112, P1 and P2 be withdrawn. Claims 1-22 are allowable.

## CONCLUSION

Applicant has explained and clarified the patentability of the present invention, as recited in claims 1-22. Applicant requests that the Examiner withdraw the 35 U.S.C. 112 rejections of Claims 1-22 in light of Applicant's discussion above and the amendments.

Given the fact that the Applicant has now fully addressed the Examiner's concerns, and the several official actions already addressed in this case, Applicant respectfully requests the Examiner to initiate a telephone conference with the undersigned Applicant's associated attorney Dennis Lee, by calling (650) 529-8730, in order to address any remaining concerns of the Examiner and thus expedite the prosecution of this application.

Accordingly, in view of the above remarks, Applicant submits that this application is now ready for allowance. Early notice to this effect is solicited.

Respectfully submitted,

  
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